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AUTHOR Handrick, Fannie A.
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ABSTRACT

A description of the 1974-75 Delaware Educational Assessment Program and a summary of the data gathered and analyzed as part of the program is provided. The report is divided into two major sections: the first part provides a description of the program including purposes, data collected, instrumentation, and reports prepared. The second part of the report summarizes the data that were gathered and analyzed. Statewide data on pupils are presented as are the results of some preliminary analyses of the relationships found between student achievement and selected school and community resources. (Author/BJG)

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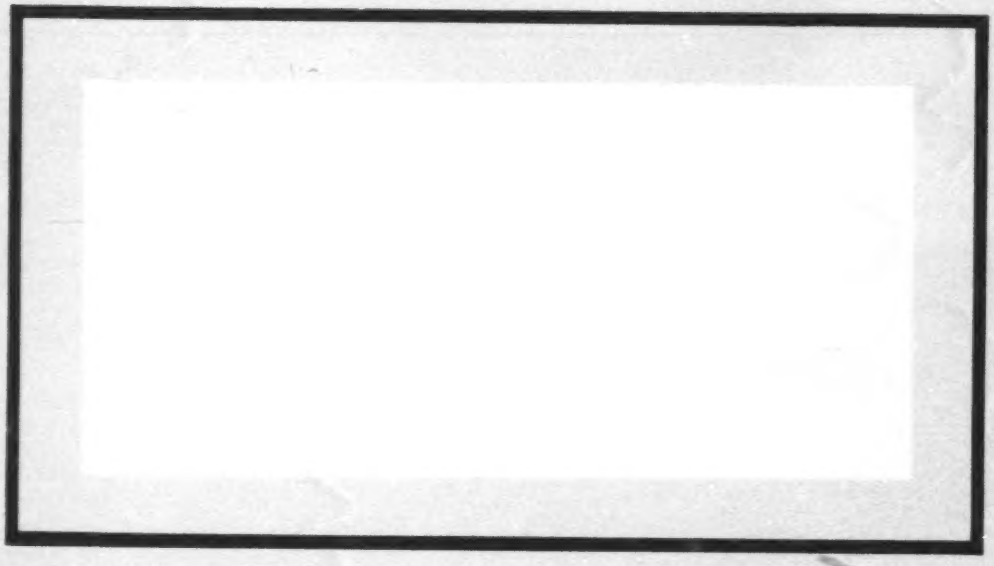

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STATE OF DELAWARE

DEPARTMENT OF PUBLIC INSTRUCTION
DOVER, DELAWARE 19901

REPORT OF THE SPRING 1975 TESTING PROGRAM

DELAWARE EDUCATIONAL ASSESSMENT PROGRAM 1974-75

By FANNIE A. HANDRICK
State Specialist
Planning Federal Programs

THE DELAWARE DEPARTMENT OF PUBLIC INSTRUCTION

KENNETH C. MADDEN, *State Superintendent*

HOWARD E. ROW, *Assistant State Superintendent, Auxiliary Services Branch*

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SUMMARY

The following paragraphs are based on analyses of the results of the Delaware Educational Assessment Program. That program and the procedures used in analyzing the data are described in detail in the body of this report.

Student Performance

Grade One

The performance of first-grade students in Delaware is better than the national norms on identical achievement items embedded in the test batteries.

Reading. First-grade students are most proficient in the readiness skill of visual discrmination, and least proficient in the ability to see and use relationships and to draw conclusions.

English. First-grade students are equally proficient on the two categories of listening skills measured by this test: listening for information and listening for evaluation.

Generally, they performed less well on the study skills section of the test. Within that section, they excel in the ability to recognize letters of the alphabet, but find it more difficult to state a reason for a given response.

Mathematics. First-grade students are most proficient in dealing with numbers and numerals, and they excel in the ability to name the cardinal number of an illustrated set. They gave the poorest performance in mathematical reasoning.

Grade Four

When differences between the groups in measured ability are taken into consideration, the performance of fourth-grade students in Delaware is superior to that of a national norming group on identical items embedded in the test batteries.

Reading. Fourth-grade students show the greatest proficiency in study skills and the least proficiency in the ability to use relationships, draw conclusions, and make inferences.

English. Fourth-grade students are most proficient in handwriting and mechanics, particularly in spelling. They do considerably less well in the area of language usage, particularly in the appropriate use of parts of speech.

In literature, they have difficulty in identifying various literary forms.

Mathematics. Fourth-grade students are most proficient in geometry and least proficient in probability and statistics.

Science. Fourth-grade students have little difficulty in distinguishing between vertebrate and invertebrate animals. They find it most difficult to use physical properties to define an object and to distinguish observations from inferences.

Social Studies. Fourth-grade students are equally proficient in the general areas of inquiry skills and social studies understandings. They have difficulty in understanding cultural variation.

Grade Eight

The performance of eighth-grade students in Delaware is inferior to that of a national norming group on identical items embedded in the test battery even when differences in measured ability of the two groups are considered.

Reading. Eighth-grade students are most proficient in the ability to understand and recall the stated meaning of a reading selection. They are less able to demonstrate study skills.

English. Eighth-grade students are most proficient in the ability to communicate thoughts and ideas in writing, but they have difficulty using language properly.

They are slightly better in demonstrating a response to literature than in dealing with the form of literature and understanding its structure.

In the area of study skills, they were most able in providing reasons for a given response.

Mathematics. Eighth-grade students show the greatest proficiency in solving equations, performing arithmetical operations, and identifying mathematical properties. They are least proficient in mathematical reasoning.

Science. Eighth-grade students are most proficient in the specific skill of distinguishing between hypotheses and other types of statements. They have the greatest difficulty in ordering and describing the structural units of living organisms.

Social Studies. Eighth-grade students are more proficient in the area of social understandings than in that of inquiry skills. They have difficulty identifying reliable and unreliable sources of information in a given situation.

Student Performance and School and Community Resources

At both the school and district levels, DEAP measures of community resources appear to bear a stronger relationship to measures of student performance than do school resources.

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INTRODUCTION

This report provides a description of the 1974-75 Delaware Educational Assessment Program and a summary of the data gathered and analyzed as part of the program. Several other manuals and reports, which have been or are in the process of being prepared, are noted as references. The report is divided into two major sections: the first part provides a description of the program including purposes, data collected, instrumentation, and reports prepared. The second part of the report summarizes the data that were gathered and analyzed. Statewide data on pupils are presented as are the results of some preliminary analyses of the relationships found between student achievement and selected school and community resources.

The Delaware Educational Assessment Program (DEAP) is part of a plan for educational program improvement. A short description of this plan, the Delaware Educational Accountability System (DEAS), is presented below to place the assessment program in its proper perspective.

DESCRIPTION OF DEAS

DEAS[1] is a comprehensive long-range plan developed to improve education in Delaware's public schools through the cooperative efforts of the Department of Public Instruction and the local school districts. Its purpose is to answer the following questions:

* What do we want from our educational system?
* What have we attained?
* What are our program strengths and weaknesses?
* What can be done to improve programs?

The first question was partially answered by the adoption of statewide educational goals by the State Board of Education in 1972. These goals have been expanded through the development of statewide objectives in the basic skill areas of communications (reading and English), mathematics, science, and social studies in grades one, four, and eight. A preliminary set of objectives has also been developed for health. These statewide educational objectives are the product of the cooperative efforts of the DEAS task forces and the Department of Public Instruction. The DEAS task forces, one for each subject, are composed of representatives of local school districts throughout the state. As time permits, plans call for expansion of the program to include the development of objectives for grade eleven and for the remaining goal areas adopted by the State Board. When these tasks have been completed, Delaware should have a reasonably complete response to the question, "What do we want from our educational system?"

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[1] A more complete description of the plan is contained in the monograph, Systematic, Comprehensive, Long-Range Plan to Improve Education in the Delaware Public Elementary and Secondary Schools, DPI, April 1972.

The assessment program is primarily concerned with the second and third questions. DEAP provides annual data on student performance as well as on school and community characteristics. As the data are analyzed and interpreted, partial answers can be given to questions concerning the current status of education in Delaware, and the relative strengths and weaknesses of various educational programs can be determined.

The analyses and interpretation of the assessment data will lead to program modifications and improvements, which is the primary purpose of the DEAS plan. This last step is the responsibility of local school personnel, but can probably be best accomplished with assistance from the staff of the Planning, Research, and Evaluation Division and of the Instruction Division.

DESCRIPTION OF DEAP

The 1974-75 assessment program involved the collection and analyses of information relating to school and community resources and to student performance. Data on 26 school and community resource variables were collected from 151 schools and 23 regular school districts. The student performance data were obtained from the DEAP test batteries, which were administered to approximately 26,500 students. In addition, about 1,060 grade-one students in Delaware's Catholic Diocesan schools were tested. The system:

* provides data on the academic achievement of each participating student.
* provides information on the ability and achievement of students in each school, each district, and in the state as a whole.
* measures the degree of relationship between student performance and selected school and community resources.
* provides baseline data for studying changes in performance of students enrolled in ESEA Title I programs.

School and Community Resource Variables

The following description of school and community resources includes an indication of whether the data were collected at the school or district level. The school-level data were averaged to produce district scores. Regardless of the source of the information, only those data pertaining to schools or districts participating in DEAP were used in establishing values for these variables.

Values for the following variables are based on responses to the Principal's Questionnaire (school level).

Composite socioeconomic status (SES)
Fathers' educational level
Mothers' educational level
Parents' occupation
Housing type
Library books per pupil

Values for the following variables are based on information in the state educational personnel file (school level). All values were taken from the 1974-75 file except for Teachers' Average Salary. The values for that variable were taken from the 1973-74 file.

Percent of teachers with master's degrees
Teacher average salary
Average years teaching experience
Teachers per 1000 pupils
Guidance counselors per 1000 pupils (grade eight only)
Mean teacher age

Values for the following variables are based upon information in the Report of Educational Statistics, 1973-74 (district level).

Attendance rate
Local revenue per pupil
Financial effort index
Full value of real estate per pupil
Current expense per pupil
Student population density
State revenue per pupil
Instructional cost per pupil
Dropout rate

Values for the teacher starting salary (B.A., no experience) were taken from the DSEA 1974-75 Teachers' Salary Schedule; those for AFDC per 1000 pupils are based on information received from the Department of Health and Social Services. Data in the September 30, 1974 pupil enrollment report were used to compute those variables reported on a per pupil basis.

Student Performance Variables

Scores on each of the ability and achievement tests in the test battery administered at grades one, four, and eight were used to determine levels of student performance. The test battery for each grade level is based on the appropriate form of standardized tests. For each testing cycle, the achievement tests have been modified to provide successively better measures of the achievement of Delaware's statewide objectives. Test modifications are the result of the work of the DEAS task forces, the Department of Public Instruction, and Educational Testing Service.

The first-grade battery is composed of achievement tests in communications (reading and English) and mathematics. These tests are modifications of the Cooperative Primary Tests. The English test, which places emphasis on the spoken word, measures students' study skills as well as those of critical thinking and listening for evaluation. The reading test measures students' skills in auditory and visual discrimination, word recognition, and comprehension. The mathematics test measures skills and understandings in the areas of: numbers/numerals, numeration, operations and properties, mathematical sentences (equations), geometry, measurement, and mathematical reasoning.

The fourth- and eighth-grade batteries are composed of aptitude and achievement tests; they include tests of verbal ability, quantitative ability, communications (reading and English), mathematics, science, and social studies. The ability tests are reprints of the School and College Ability Tests. The verbal ability tests measure how well the student uses words, and the quantitative ability tests measure the student's understanding of mathematical ideas. The achievement tests are modifications of the Sequential Tests of Educational Progress, Series II, and of some of the science items from the National Assessment of Educational Progress (NAEP). The reading tests measure skills in word recognition, comprehension, and the use of resource materials. The English tests measure handwriting and mechanics, language usage, and form of and response to literature. The mathematics tests measure skills and knowledge of basic concepts in the areas of numbers/numerals, numeration, operations and properties, mathematical sentences, geometry, measurement, graphing and functions, probability and statistics, and mathematical reasoning. The science tests measure knowledge of physical and life sciences; the social studies tests, inquiry skills and social understandings.

Types of scores. Each achievement test in the batteries described above yields a score. In addition, a composite achievement score is computed for each student who has completed all the tests in a battery.

The ability test administered at grades four and eight yields three scores: verbal aptitude, quantitative aptitude, and total aptitude. The total aptitude score for each student is the sum of the scores obtained on the verbal and quantitative parts of the test.

The raw score scale for each of the achievement and ability tests is transformed to a T-score scale with a mean of 50 and a standard deviation of 10. The composite achievement score is the average of an individual's T-scores on the achievement tests in a given battery.

Reports Prepared

A series of twenty different computer-generated reports were prepared from the data collected in 1974-75. These reports provided information at the student, school, district, and state level.[2]

Student reports. Two types of labels were used to report individual student results: a school label, and a parents' label. The school label shows the score achieved on each test and the composite achievement score in three forms: T-score, statewide percentile, and district percentile. The parents' label reports the same scores in percentile form only. In addition, both labels report identifying information such as the student's name, sex, birthdate, grade level, and the testing date.

School and district reports. Each school and district participating in the program received several group reports that aggregated the data on

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[2] More complete descriptions of the student, school, and district reports are provided in DEAP Manual 1, August 1975, and DEAP Manual 2, September 1975; DPI.

individual students. The first of these reports, the Roster of Student Scores, is an alphabetical listing of all students tested at the school with the scores they achieved.

The second group report, the Distribution of Student T-scores, was prepared for each school and district for each test administered. This report provides a count of the number of students achieving each score, the number of students tested, the mean, the standard deviation, and the range of scores attained.

Data similar to that provided by the distribution reports were also displayed in a series of histograms. This third set of group reports was prepared to help simplify the interpretation of the distribution data.

The fourth set of group data reports, Item Response by Objectives, was also prepared for each school and district for each test administered. These reports show the percentage of students in the school or district who chose each of the possible answers to each of the test items. Statewide percentages of students giving the correct answer and complete statements of the educational objectives that the items measure are also reported.

Finally, a Profile was prepared for each school and district. This report presents the school or district values on selected community and resource variables and summary statistics on the achievement measures for each grade tested.

Statewide reports. The student data were aggregated to give statewide information in the same types of reports as were prepared for schools and districts. Several supplementary statewide reports were also produced as part of the basic data analysis. A partial list of these reports follow:

** Statewide Distribution of Raw Scores and Scaling Parameters (prepared for each test administered at each grade tested)

* Statewide Distribution of Student T-scores (prepared for each test administered at each grade tested)

* Item Response by Objectives (prepared for each test administered at each grade tested)

* Correlation of District Scores (provides an intercorrelation matrix of district means on all tests and the community and school resource variables)

* Correlation of School Scores (provides an intercorrelation matrix of school means on all tests and the community and school resource variables)

* Statewide Distribution of Student T-scores for Students enrolled in ESEA Title I programs (prepared for each test administered at each grade tested)

* Distribution of District Scores (a distribution of the district means on all tests administered and on all school and community resource variables)

* Distribution of School Scores (a distribution of the school means on all tests administered and on all school and community resource variables)

* Test Analysis Reports (three reports that provide detailed psychometric analysis of the test batteries used at each grade tested)

In addition, all data on students, schools, and districts have been transcribed to magnetic tape, and a set of equating parameters to relate scores on the 1975 tests to those on the 1974 forms has been developed.

STATEWIDE STUDENT RESULTS

Tables 1, 2, and 3 provide a statistical summary of the statewide student results for grades one, four, and eight, respectively. Each table shows the number of students tested and the number of items, the average or mean score, the range of scores, and the reliability coefficient for each test.

TABLE 1

GRADE ONE: SUMMARY OF INDIVIDUAL STUDENT SCORES

1975 Delaware Educational Assessment Program

Test or Score	Number of Students*	Number of Items on Test	T-scores			Reliability Coefficient
			Mean	Std. Dev.	Range**	
Reading	8096	50	50.00	9.89	7 to 63	.916
English	8120	50	49.99	10.03	-9 to 63	.842
Mathematics	8102	55	50.08	9.95	-4 to 67	.874
Composite Achievement	8068	--	50.06	8.78	13 to 64	.948

* Approximately 1,060 Catholic school students were also tested. Their results are not included in this table; similar tabulations of their results will be found in the Appendix (page 29).

** Negative T-scores are possible when the transformation from raw to T-scores involves a negative intercept. In the first grade transformations, this occurs in English and mathematics where raw scores below 15 and 4, respectively, are equal to negative T-scores.

TABLE 2

GRADE FOUR: SUMMARY OF INDIVIDUAL STUDENT SCORES

1975 Delaware Educational Assessment Program

Test or Score	Number of Students	Number of Items on Test	T-scores			Reliability Coefficient
			Mean	Std. Dev.	Range	
Verbal Aptitude	8597	50	50.03	10.01	24 to 76	*
Quantitative Aptitude	8578	50	50.00	9.99	17 to 77	*
Total Aptitude	8567	100	49.99	9.99	18 to 77	*
Reading	8564	60	50.01	10.02	18 to 66	.943
English	8511	100	49.98	9.99	18 to 70	.956
Mathematics	8572	75	50.01	9.99	22 to 70	.946
Science	8569	50	50.00	10.14	23 to 73	.903
Social Studies	8579	30	50.04	10.00	22 to 70	.864
Composite Achievement	8414	--	50.08	9.17	21 to 69	.980

* Not analyzed because the same tests were used in the four previous administrations.

TABLE 3

GRADE EIGHT: SUMMARY OF INDIVIDUAL STUDENT SCORES

1975 Delaware Educational Assessment Program

Test or Score	Number of Students	Number of Items on Test	T-scores			Reliability Coefficient
			Mean	Std. Dev.	Range	
Verbal Aptitude	9696	50	50.00	10.01	19 to 71	*
Quantitative Aptitude	9690	50	49.98	10.05	21 to 72	*
Total Aptitude	9682	100	49.99	9.99	22 to 72	*
Reading	9664	60	50.00	10.02	23 to 69	.934
English	9624	100	50.00	10.00	22 to 73	.943
Mathematics	9583	75	50.00	10.00	26 to 70	.948
Science	9640	50	50.00	9.99	18 to 73	.888
Social Studies	9636	35	49.96	9.96	20 to 67	.888
Composite Achievement	9428	--	50.17	9.14	26 to 69	.980

* Not analyzed because the same tests were used in the four previous administrations.

Student Performance Related to Objectives

The statewide educational objectives are a convenient and useful basis for classifying test items within a subject (e.g., reading) into clusters or groups of items that measure specific skills or tasks. With the aid of such item-clusters and of the information available on the percentage of students who correctly answered each item, it is possible to identify those skills or tasks on which students perform poorly or exceptionally well.

To make this determination for each subject tested at each grade level, items were classified according to the statewide objectives. The percentages of students answering each item correctly were summed across all the items in a cluster, and that sum was divided by the number of items in the cluster. The resultant mean or average percent correct was computed for each cluster. These computations were limited to those clusters containing three or more items. The results for grades one, four, and eight are presented in Tables 4, 5, and 6, respectively.

Grade one, reading. First-grade students performed best on those test items related to the category of objectives labeled readiness. Within that category, their performance was best on those items dealing with visual discrimination.

These students performed least well in the comprehension category of objectives. The poorest performance occurred on those items dealing with interpretive comprehension.

Grade one, English. On the listening portion of this test, first-grade students performed equally well on items concerned with the ability to listen for information and those concerned with listening for evaluation.

They performed less well on the study skills section of the test. They did better on items dealing with reference skills than on those dealing with critical thinking skills. They excelled in the ability to recognize letters of the alphabet, but found the items requiring the ability to state a reason for a given response most difficult.

Grade one, mathematics. The first-grade mathematics test can be divided into seven categories of items. Of these seven categories, the students showed the greatest proficiency in answering the items dealing with numbers and numerals. Within this category, they excelled in the ability to name the cardinal number of an illustrated set of 100 or fewer elements.

First-grade students had the greatest difficulty with the items designed to measure mathematical reasoning.

TABLE 4

GRADE ONE: STUDENT PERFORMANCE BY OBJECTIVE

1975 Delaware Educational Assessment Program

Category	Objective	Number of Items	Mean Percent Correct
	READING		
A. Readiness		12	87.6
	A4. Visual Discrimination	3	92.7
	A3. Auditory Discrimination	9	86.1
B. Word Recognition		26	80.2
	B2. Sight Vocabulary	11	80.0
	B3. Phonic Analysis	11	83.9
	B4. Structural Analysis	4	70.3
C. Comprehension		20	66.2
	C1. Literal	13	68.5
	C3. Critical	4	66.8
	C2. Interpretive	6	63.3
	ENGLISH		
LISTENING			
A. Listen for Information		23	87.3
	A1. Follow oral directions and A3. Listen for the purpose of answering questions	23	87.3
B. Listen for Evaluation		4	87.3
	B1. Analyze an oral presentation.	4	87.3
STUDY SKILLS			
B. Reference Skills		19	86.4
	B1. Recognize letters of the alphabet.	3	94.3
	B3. Derive information from audio-visual materials.	12	86.6
	B4. Use various printed materials.	4	80.0
C. Critical Thinking		10	77.5

TABLE 4 (Continued)

Category	Objective	Number of Items	Mean Percent Correct
	C2. Arrange pictures and/or topics in sequence.	5	80.6
	C1. State a reason for a given response.	5	74.4
	MATHEMATICS		
A. Numbers/ Numerals		19	83.6
	A10. Name the cardinal number of any illustrated set of up to 100 elements.	3	91.3
	A1. Use qualitative terms to compare sets of objects.	3	80.3
	A8. Recognize simple fractional parts of a unit.	3	71.7
E. Geometry		6	82.8
	E1. Identify basic geometric shapes.	4	90.5
F. Measurement		5	76.2
	F2. Demonstrate simple measurements.	3	64.3
B. Numeration		5	75.4
C. Operations and Properties		10	69.4
	C3. Illustrate the relationship between joining two disjoint sets and the addition of whole numbers.	3	74.0
	C2. Use the addition facts and corresponding subtraction facts with whole numbers.	3	71.0
D. Mathematical Sentences		6	67.0
	D1. Write a number phrase or sentence.	3	68.3
I. Mathematical Reasoning		14	63.4
	I3. Interpret quantitative picture problems.	9	65.1

Grade four, reading. In this test, fourth-grade students performed best on those items dealing with study skills. Performance was poorest on those items concerned with the comprehension category, and within that category, the items dealing with literal comprehension proved to be the most difficult.

Grade four, English. Items on the fourth-grade English test can be divided into two main sections: writing and literature.

Students showed the greatest proficiency on the writing items dealing with handwriting and mechanics, particularly on the spelling items. They did considerably less well on those items concerned with language usage.

At the objective or specific skill level of item clusters, fourth-grade students had the greatest difficulty with the items dealing with punctuation and those concerned with the appropriate use of parts of speech.

Students did less well on the literature items than on the writing items, and had the greatest difficulty exhibiting the ability to identify various literary forms.

Grade four, mathematics. Items on the fourth-grade mathematics test can be divided into eight major categories. Of these eight major categories, the students performed best on those items classified under geometry. They were least proficient in dealing with items concerned with probability and statistics.

Grade four, science. The current set of science objectives are not divided into major categories. Consequently, the average percentage of students answering clusters of items correctly can be computed and interpreted only in terms of specific objectives. Fourth-grade students showed the greatest proficiency in distinguishing between vertebrate and invertebrate animals. Their performance was poorest on the items related to two specific skills: using physical properties to define an object, and distinguishing observations from inferences.

Grade four, social studies. Fourth-grade students performed at about the same level of proficiency in answering the items designed to measure the two major categories of social studies objectives: inquiry skills and understandings. They performed best on the items concerned with an understanding of land-man interaction, and had the greatest difficulty with items dealing with an understanding of cultural variation.

TABLE 5

GRADE FOUR: STUDENT PERFORMANCE BY OBJECTIVE

1975 Delaware Educational Assessment Program

Category	Objective	Number of Items	Mean Percent Correct
	READING		
D. Study Skills		8	68.4
	D2. Reference Skills	4	66.0
C. Comprehension		51	65.6
	C2. Interpretive	36	67.6
	C1. Literal	15	60.9
	ENGLISH		
WRITING			
A. Handwriting and Mechanics		40	78.3
	A4. Spelling	24	67.6
	A2. Capitalization	22	60.9
	A3. Punctuation	24	57.7
B. Language		41	59.8
	B1. Recognize and use appropriate grammatical units.	24	62.2
	B2. Use parts of speech appropriately.	18	57.7
LITERATURE			
A. Form of Literature		9	58.3
	A2. Know selected literary elements.	5	59.6
	A4. Identify various forms.	4	56.8
	MATHEMATICS		
E. Geometry		6	70.7
B. Numeration		5	69.4
	B1. Interpret the place value for whole numbers.	3	68.0

TABLE 5 (Continued)

Category	Objective	Number of Items	Mean Percent Correct
C. Operations and Properties		24	60.5
	C1. Compute sums and differences of whole numbers.	9	72.1
	C2. Multiply whole numbers up to a three-digit factor by a two-digit factor.	3	70.0
	C3. Divide whole numbers with a one-digit divisor and a four-digit dividend	4	50.0
	C9. Add and subtract a pair of like fractions.	3	42.7
I. Mathematical Reasoning		14	57.6
	I2. Read, interpret, and solve word/picture problems.	9	68.3
	I1. Estimate solutions in problem solving situations.	3	40.7
D. Mathematical Sentences		10	55.8
	D1. Solve simple open sentences.	6	58.7
	D3. Identify correct relations symbols.	3	54.6
F. Measurement		16	51.1
	F4. Add and subtract measurements that do not involve converting from one unit to another.	6	66.5
	F2. Convert a simple measure from one unit to another within the same system.	6	51.3
A. Numbers/ Numerals		5	50.8
H. Probability and Statistics		4	49.0
	H1. Construct and interpret bar and line graphs.	3	58.3
	SCIENCE		
	4.35 Distinguish between vertebrate and invertebrate animals.	3	68.7

TABLE 5 (Continued)

Category	Objective	Number of Items	Mean Percent Correct
	4.5 Identify and name variables related to an investigation.	5	63.2
	4.30 Identify and describe the responses of living things to changes in their environment.	4	57.3
	4.29 Describe some of the interdependencies among living things and the environment.	5	56.8
	4.46 Describe the relationship of variables in an investigation.	10	56.2
	4.34 Describe the effects of soil, water, and light on the parts of plants.	3	55.7
	4.23 Compare the sun, moon, stars, planets, and their relation to the earth.	4	55.5
	4.28 Describe the effects of gravity on objects.	4	55.5
	4.3 Use the attributes of an object to describe it so that it can easily be identified in a collection of similar objects.	5	55.4
	4.6 Distinguish between hypotheses, predictions, and guesses based on student-observed data.	3	55.0
	4.11 Describe and interpret raw data and comparison of events using student observation.	5	54.8
	4.8 Use the metric system to describe or distinguish objects in terms of mass, length, area, and volume.	5	48.6
	4.7 Define an object using its physical properties.	5	43.2
	4.10 Distinguish observations from inferences.	3	43.0

TABLE 5 (Continued)

Category	Objective	Number of Items	Mean Percent Correct
	SOCIAL STUDIES		
B. Understandings		18	57.9
	B5. Land-man interaction	5	64.6
	B2. Scarcity	3	63.3
	B1. Social interaction	4	57.0
	B4. Cultural variation	5	52.8
A. Inquiry Skills		25	57.5
	A6. Note significant details needed to draw conclusions from pictorial material.	7	62.3
	A3. Determine distance on a map.	3	60.0
	A7. Draw inferences based on data found in a graph or table.	7	57.1

Grade eight, reading. In this test, eighth-grade students performed best on the items classified under the general category of comprehension. Within that category, they showed their greatest strength in answering items concerned with literal comprehension.

Students did less well on items dealing with study skills, and their performance was poorest on those items related to basic book skills.

Grade eight, English. Items on the eighth-grade English test can be divided into three sections: writing, literature, and study skills.

Within the writing section, student performance was best on the items classified under composition, particularly on those items designed to measure the ability to communicate thoughts and ideas in writing. The students gave the least average percentage of correct answers to those language items dealing with the proper use of language.

Eighth-grade students showed a slightly greater proficiency in answering items dealing with response to literature than in answering those dealing with forms of literature. Performance was particularly poor on the items concerned with understanding the structure of literature.

Items in the study skills section of the test were designed to measure critical thinking skills. Students were most proficient on those items concerned with providing reasons for a given response.

Grade eight, mathematics. Of the seven major categories into which items on the mathematics test can be divided, eighth-grade students gave the greatest average percentage of correct responses to those dealing with mathematical sentences and with operations and properties. Within those two categories they found it most difficult to solve percentage problems, and had some difficulty in computing the sum, product, difference, or quotient of two positive rational numbers.

Eighth-grade students were least proficient in answering items involving mathematical reasoning. They performed most poorly on those items requiring them to round off rational numbers.

Grade eight, science. Inasmuch as the science objectives are not divided into major categories, the average percentage of students answering clusters of items correctly can be computed and interpreted only in terms of specific objectives. Eighth-grade students were most proficient in distinguishing between statements that are hypotheses and those that are not; they were least proficient in ordering and describing the structural units of living organisms.

Grade eight, social studies. On the average, a greater percentage of eighth-grade students correctly answered the items dealing with social studies understandings than the percentage who correctly answered those dealing with inquiry skills. They were most proficient in answering items concerning an understanding of land-man interaction, and least proficient in answering those dealing with the identification of reliable and unreliable sources of information in a given situation.

TABLE 6

GRADE EIGHT: STUDENT PERFORMANCE BY OBJECTIVE

1975 Delaware Educational Assessment Program

Category	Objective	Number of Items	Mean Percent Correct
	READING		
C. Comprehension		54	61.8
	C1. Literal	26	66.5
	C3. Critical	3	62.0
	C2. Interpretive	28	57.5
D. Study Skills		6	65.8
	D2. Reference Skills	3	70.0
	D1. Basic Book Skills	3	61.7
	ENGLISH		
WRITING			
C. Composition		5	68.6
	C2. Communicate thoughts and ideas in writing.	3	75.3
A. Handwriting and Mechanics		49	58.2
	A4. Spelling	24	62.4
	A2. Capitalization	13	56.6
	A3. Punctuation	17	51.9
B. Language		34	55.0
	B1. Structure appropriate grammatical units.	8	60.4
	B2. Use language properly.	31	54.7
LITERATURE			
B. Response to Literature		4	67.5
	B4. Recognize interrelationship of literature, society, and the individual.	3	68.3

TABLE 6 (Continued)

Category	Objective	Number of Items	Mean Percent Correct
A. Form of Literature		11	66.1
	A2. Know selected literary elements.	3	65.3
	A4. Understand structure.	4	57.0
C. Critical Thinking		5	64.6
	C1. Support reason(s) for a given response.	3	68.7
	MATHEMATICS		
D. Mathematical Sentences		15	60.7
	D1. Solve simple linear equations.	4	74.0
	D4. Solve problems using proportions.	5	63.2
	D3. Solve percentage problems.	4	41.3
C. Operations and Properties		25	60.6
	C1. Solve addition, subtraction, multiplication, and division problems using whole numbers.	7	69.4
	C3. Compute the sum, product, difference, and quotient of any two positive rational numbers.	13	57.0
B. Numeration		5	59.4
	B2. Express a positive rational number in its equivalent forms.	3	54.7
H. Probability and Statistics		6	57.7
	H1. Construct and interpret bar, circle, and line graphs.	3	65.7
	H3. Determine an average and median for a given set of data.	3	49.7
A. Numbers/ Numerals		6	55.5
E. Geometry		9	53.6

TABLE 6 (Continued)

Category	Objective	Number of Items	Mean Percent Correct
I. Mathematical Reasoning		18	53.3
	I1. Simplify an expression or solve an equation.	3	60.3
	I3. Read, interpret, and solve picture/word problems.	9	53.3
	I4. Estimate solutions in problem solving situations.	3	51.0
	I2. Round off rational numbers from thousandths to millions.	3	48.7
	SCIENCE		
	8.4 Distinguish between statements that are hypotheses and those that are not.	3	68.3
	8.33 Interpret the effects of causes of changes of the water cycle in meteorological terms.	3	64.7
	8.19 Properly identify relevant information and use it to interpret a data table or graph.	7	64.4
	8.5 Interpret an hypothesis from a set of observations.	6	64.2
	8.89 Distinguish between physical and chemical changes.	3	62.0
	8.49 Identify physical and biological environmental factors and the response of living things to them.	6	60.0
	8.8 Describe what a model is and how models can be helpful.	3	56.7
	8.90 Order and describe the structural units of living organisms.	3	28.7
	SOCIAL STUDIES		
B. Understandings		15	70.5
	B2. Land-man interaction	4	72.3
	B1. Cultural pluralism	6	68.5

TABLE 6 (Continued)

Category	Objective	Number of Items	Mean Percent Correct
A. Inquiry Skills		29	63.6
	A6. Use charts to compare sizes and quantities.	8	70.5
	A8. Arrange events in sequential order.	3	63.3
	A5. Distinguish relevant from irrelevant information in a particular situation.	10	60.1
	A4. Identify reliable and unreliable sources of information pertinent to a given question.	3	57.0

Delaware in Comparison to the Nation

Because four of the five achievement tests used in the assessment program have been modified each year to provide more congruency between the statewide objectives and the test items, the total test performance of students in any given year cannot be compared to that of a national sample of students. Such comparisons can be based, however, on responses to identical items that are common to the published batteries and to the DEAP batteries administered in successive years.

The data given in this subsection pertain only to such common items and are based upon the percentages of students that answered the common items correctly. The tabled percentages are the averages of the percentage of correct responses given by each comparison group to each common item. These mean percentages may be interpreted as the percentage of the group that correctly answered each item or as the percentage of the items answered correctly by the average group member.

Because the ability tests administered at grades four and eight are the appropriate forms of the published tests and have not been changed, group comparisons of the type reported here could be made on the basis of total test performance. Comparisons of the performance of the two groups on these tests are reported in terms of mean percentage of correct responses, however, so that the results will be in the same form as those for the achievement tests.

The social studies tests which were administered at grades four and eight were developed to the specifications of the Department of Public Instruction and DEAS social studies task force and have not been normed on a nationwide student sample. Consequently, no national norms are available for all or part of these tests.

Grade one. Comparisons between the performance of Delaware's grade-one students and those in the national sample are given in Table 7. That table indicates that Delaware first graders exceeded the national norms on all sets of common items. Differences ranged from +6.9 percent in the English test to +8.1 percent in mathematics.

TABLE 7

GRADE ONE: COMPARISON OF DELAWARE AND THE NATION

1975 Delaware Educational Assessment Program

Test	Number of Items on Test	Number with National Norms	Mean Percent Correct Response		
			Delaware	Nation	Difference
Reading	50	40	77.2	70.0	+ 7.2
English	50	30	84.0	77.1	+ 6.9
Mathematics	55	30	76.8	68.7	+ 8.1

Grade four. Comparisons between the performance of Delaware's fourth-grade students and those in the national samples are given in Table 8. The only difference between format of Table 7 and that of Table 8 arises from the fact that the national norms for the science test are a composite of the norms from STEP II and NAEP items. For that reason, separate comparisons are shown for each of the two sets of items.

Table 8 indicates that, in general, Delaware students gave fewer correct responses than did the corresponding national norming group to all but one of the sets of common items in the achievement tests. Delaware students gave a slightly greater number of correct responses to the common items on the reading test than did the students in the national sample.

Inasmuch as the ability test (SCAT, Series II) and the items from STEP, Series II were administered to the same national sample and to students in Delaware, a comparison can be made that, in effect, allows for the difference in ability between these two groups. Table 8 shows a difference of approximately four percentage points between the measured abilities of Delaware fourth-grade students and those of students in the national sample; consequently, one would expect differences of the same magnitude and in the same direction in the measured achievement of these two groups. Such is not the case. Although the differences in both ability and achievement generally favor the national group, the difference in ability is greater than the overall difference in achievement. In other words, the performance of this group of fourth-grade students in Delaware is superior to that of this national sample when measured abilities are taken into consideration.

The ability level of the national sample who responded to the NAEP items is unknown so no comparison that involves ability difference between that group and Delaware students can be made. The fact remains, however, that the performance of Delaware fourth graders was poorer than that of the national sample on those items.

TABLE 8

GRADE FOUR: COMPARISON OF DELAWARE AND THE NATION

1975 Delaware Educational Assessment Program

Test	Number of Items on Test	Number with National Norms	Mean Percent Correct Response		
			Delaware	Nation	Difference
Verbal Ability	50	50	48.1	51.0	- 2.9
Quantitative Ability	50	50	53.0	58.8	- 5.8
Total Ability	100	100	51.1	54.9	- 3.8
Reading	60	17	66.2	65.7	+ 0.5
English	100	68	61.7	64.8	- 3.1
Mathematics	75	43	60.5	61.5	- 1.0
Science	50	32			
STEP, II		16	56.6	58.4	- 1.8
NAEP		16	58.6	68.2	- 9.6

Grade eight. Comparisons between the performance of Delaware's eighth-graders and those in the national norming group are given in Table 9. That table indicates that the eighth-grade students in Delaware gave fewer correct responses than did the national groups to both the ability tests and the common items in the achievement tests.

As is true of the fourth-grade results, it is possible to make a comparison between the achievement performance of Delaware students and those of the STEP II norming sample that takes the diffference in the measured ability of those two groups into consideration. Students in the national sample perform better on both the ability tests and the sets of achievement items. Table 9 indicates an ability difference of approximately 3.5 percentage points and an overall achievement difference of about 6.0 percentage points. One must conclude, therefore, that the performance of this group of Delaware eighth-graders is inferior to that of this national norming sample even when differences in the measured ability of the two groups are considered.

Inasmuch as the measured ability of the NAEP norming sample is unknown, it is not possible to relate the ability and achievement of that group to the ability and achievement of the Delaware students. The latter group performed less well on the NAEP items than did the national sample.

TABLE 9

GRADE EIGHT: COMPARISON OF DELAWARE AND THE NATION

1975 Delaware Educational Assessment Program

Test	Number of Items on Test	Number with National Norms	Mean Percent Correct Response		
			Delaware	Nation	Difference
Verbal Ability	50	50	60.8	66.8	- 6.0
Quantitative Ability	50	50	57.4	58.2	- 0.8
Total Ability	100	100	59.1	62.5	- 3.4
Reading	60	34	59.5	66.1	- 6.6
English	100	60	58.5	66.0	- 7.5
Mathematics	75	49	58.3	65.4	- 7.1
Science	50	31			
STEP, II		21	63.9	70.7	- 6.8
NAEP		10	63.8	64.3	- 0.5

RELATIONSHIPS BETWEEN STUDENT PERFORMANCE AND SCHOOL AND COMMUNITY RESOURCES

Data collected on students were aggregated to the school and district level and combined with the data collected on resources at those levels in an investigation of the relationships between pairs of these two types of variables.

Student Performance and School Resources

These relationships were determined by computing the zero-order correlations between student achievement means and the value of the school and community resource variables at the school level. Although such correlations do not imply cause and effect, they are useful in identifying empirical relationships, the causes of which must be determined by other means.

After the zero-order correlation between each pair of school and community resource variables and student achievement means at each grade level had been computed, the significance of each coefficient was determined. At grade one there are six significant relationships between the values of the resource variables and the reading achievement means, and seven significant relationships between the value of the resource variables and each of the remaining achievement means. At grade four there were six such significant relationships and at grade eight there were eight. In general, the values of the same school and community resources are significantly related to student achievement means within and across grade levels. All significant relationships were positive.

At each grade level and for each achievement area, the correlation coefficients were put in rank order from high to low, and the average rank for each community and resource variable was computed across achievement areas. The results are given in Table 10, which lists, for each grade, the school and community resources in average rank order of the strength of their relationship to student performance measures.

An examination of Table 10 indicates that at the school level the DEAP measures of community resources are more strongly related to measures of student performance than are the DEAP measures of school resources. Before such a statement can be accepted as fact, however, a more detailed investigation of the factors underlying these sets of variables would have to be made.

TABLE 10

SCHOOL RESOURCES IN AVERAGE RANK ORDER OF CORRELATION WITH STUDENT PERFORMANCE, BY GRADE

1975 Delaware Educational Assessment Program

Grade One	Grade Four	Grade Eight
Composite SES	Composite SES	Composite SES
Mothers' Education	Parents' Occupation	Fathers' Education
Parents' Education	Mothers' Education	Mothers' Education
Fathers' Education	Housing Type	Parents' Occupation
Housing Type	Fathers' Education	Housing Type
Percent Teachers with Master's Degree	Percent Teachers with Master's Degree	Percent Teachers with Master's Degree
Library Books per Student*		Teachers per 1000 Students
		Library Books per Student

* Not significantly related to reading achievement

Student Performance and District Resources

These relationships were determined by computing the zero-order correlation between student achievement means and the values of resource variables at the district level. After these correlations had been computed, the significance of each was determined. There were 14 significant relationships among pairs of these variables at grade one and 13 at each of grades four and eight. At each grade level, all but three of these relationships were positive.

For each achievement area at each grade level, the significant correlation coefficients were put in rank order by absolute value, from high to low. The average rank for each resource variable was then computed across achievement areas. The results are shown in Table 11, which lists, by grade, the resource variables in average rank order of the strength of relationship to student performance measures.

Table 11 shows that, in general, the DEAP measures of community resources are more strongly related to student achievement measures than are the DEAP measures of school or district resources. As was pointed out under the discussion of similar relationships at the school level, a more detailed investigation of the factors underlying these sets of variables would have to be made before this interpretation of zero-order correlations could be accepted as fact.

TABLE 11

DISTRICT RESOURCES IN AVERAGE RANK ORDER OF CORRELATION WITH STUDENT PERFORMANCE, BY GRADE

1975 Delaware Educational Assessment Program

Grade One	Grade Four	Grade Eight
Fathers' Education	Fathers' Education	Composite SES
Mothers' Education	Composite SES	Fathers' Education
Composite SES	Mothers' Education	Mothers' Education
Parents' Occupation	Parents' Occupation	Parents' Occupation
Median Housing Cost	AFDC per 1000 Students*	Median Housing Cost
Percent Overcrowded Housing*	Housing Type	Housing Type
Percent Teachers with Master's Degrees	Percent Overcrowded Housing*	Percent Overcrowded Housing*
Median Monthly Rent	Median Housing Cost	AFDC per 1000 Students*
Housing Type	Percent Teachers with Master's Degrees	Attendance Rate
AFDC per 1000 Students*	Median Monthly Rent	Dropout Rate*
Real Estate per Student	Attendance Rate	Median Monthly Rent
Dropout Rate*	Dropout Rate*	Percent Teachers with Master's Degree
Attendance Rate	Real Estate per Student	Real Estate per Student
Local Revenue per Student		

* Relationship with student achievement means is negative

APPENDIX

GRADE ONE, CATHOLIC DIOCESAN SCHOOLS: SUMMARY OF STATEWIDE STATISTICS

1975 Delaware Educational Assessment Program

Test or Score	Number of Students	Number of Items on Test	T-scores Mean	T-scores Std. Dev.	T-scores Range*
Reading	1056	50	52.6	9.4	19 to 63
English	1063	50	49.9	8.8	-7 to 63
Mathematics	1057	55	51.6	9.7	14 to 67
Composite Achievement	1055	--	51.4	8.2	17 to 64

* Negative T-scores are possible when the transformation from raw to T-scores involves a negative intercept. In the first grade transformations this occurs in English and mathematics where raw scores below 15 and 4, respectively, are equal to negative T-scores.